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Electrochemical activation of chain radical processes by radical organophosphorus cations

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Abstract

It is found that electrochemically generated radical cations of organophosphorus compounds react with substrates that are capable of homolytic cleavage of the element-hydrogen bond via a radical detachment of the hydrogen atom, thus initiating the chain radical addition of the substrates over the double bond of alkenes. The presence of a strong base that is capable of deprotonating intermediate phosphonium salts in electrolyte allows one to set up an electrocatalytic cycle and use organophosphorus compounds in catalytic quantities. The main side reaction in the studied processes is the interaction between radical cations of organophosphorus compounds and olefin which leads to the formation of phosphorylated alkenes.